

CLAIMS

1. A system that determines the presence of an audio speaker connected to an audio generating component that can receive radio signals in a vehicle, the apparatus comprising:

a computer having a memory and a microprocessor;

5 a display connected to the computer;

a signal processor that outputs a frequency sweep in response to a request from the computer;

a radio frequency generator that is controlled by the computer, whereby said radio frequency generator receives operating instructions from the computer and receives the frequency sweep from the signal processor and outputs a radio broadcast signal;

a cable that receives the audio broadcast signal at a receive end and carries the audio broadcast signal to an output end, said output end removably connected to the audio generating component, whereby the audio generating component receives the audio broadcast signal from the output end of the cable and outputs the received signal to the audio speaker and the audio speaker outputs the received signal and emits an audio signal;

a microphone placed in the vehicle and connected to the signal processor that detects the emitted audio signal, said signal processor processes the signal and the emitted audio signal and outputs a waveform to the computer; and

a program stored in the memory that analyzes the waveform from the signal processor and determines the presence of a speaker according to predetermined rules.

2. A system of claim 1, wherein the speaker is at least two speakers.

3. A system of claim 1, wherein the signal processor is a digital signal processor.

4. A system of claim 1, wherein the cable output end is removably connected to a transmitting antenna and the radio broadcast signal is received at the transmitting antenna, and

5 a receive antenna receives the radio broadcast signal from the transmitting antenna, the receive antenna coupled to the audio generating component.

5 5. A system of claim 1, wherein the audio generating component is one of an AM radio, an FM radio, and AM/FM radio, a satellite radio receiver, a compact disc player, a cassette tape player, a digital audio tape player, a cellular telephone transceiver, a compact disc player/recorder, a cassette tape player/recorder, a digital audio tape player/recorder, a television, a video cassette player, a ham radio receiver or transceiver, and a digital video disc player.

6. A system of claim 1, wherein the signal is modulated.

7. A system of claim 2, wherein the program can detect the presence of more than one speaker.

8. A system of claim 1, wherein the program can determine proper speaker operation.

9. A method for determining the presence of an audio speaker in a vehicle having an audio speaker connected to an audio generating component that can receive radio signals, the method comprising the steps of:

- 5 placing a microphone in the vehicle;
transmitting a computer-controlled radio signal to the vehicle;
receiving the radio signal at the audio generating component;
converting the radio signal to an audio signal;
outputting the audio signal from the speaker;
10 detecting the speaker audio signal at the microphone; and
analyzing the detected signal for speaker presence.

10. A method of claim 9, wherein when more than one speaker is in the vehicle and connected to the audio generating device, further comprising the step of selecting at least one speaker for determination of presence and operable connection to the audio output component.

11. A method of claim 9, wherein the transmitting step comprises transmitting a predetermined modulated signal.

12. A method of claim 9, wherein the detected signal is compared to the transmitted signal and a resulting waveform is analyzed for speaker presence and speaker performance.

13. A method of claim 12, wherein the speaker performance is one of not present, present and performing below a first predetermined value or range, present and performing at a predetermined nominal value or range, and present and performing above a second predetermined value or range.

14. A method of claim 9, wherein there is more than one speaker in the vehicle and connected to the audio generating component, the presence of more than one speaker is determined.

15. A method for determining the performance level of an audio speaker in a vehicle having an audio speaker connected to an audio generating component that can receive radio signals, the method comprising the steps of:

- 5 placing a microphone in the vehicle;
 - transmitting a computer-controlled radio signal to the vehicle;
 - receiving the radio signal at the audio generating component;
 - converting the radio signal to an audio signal;
 - outputting the audio signal from the speaker;
 - 10 detecting the speaker audio signal at the microphone; and
 - analyzing the detected signal for at least one of speaker presence
- and speaker performance.